

**SOFTWARE QUALIFICATION PROCEDURE  
FOR  
TM500 TREADMILL CONTROLLER**

*June 1982*

## Revision Page

Revision	Date	Notes
1.00	1/15/91	Final Release
1.01	1/16/91	1 - Fixed all problems found in first run of test
1.01 A	1/17/91	Fixed Typographical errors in procedure

January 7, 1991

Software Qualification Procedure  
for  
TM500 Treadmill Controller

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## 0 - TESTING NOTES AND INITIAL SETUP

### 0.1 - Testing Notes

0.1.1 - This procedure has been written to qualify the TM500 Treadmill controller software. The procedure has been designed so the main testing sections may be run independently. The only requirement is the treadmill type setting be set to type 10 which is speed reset with a speed range of 1.5 - 10.5, elevation of 0 - 22% grade. To set treadmill type 10 run section 0.1 .

Throughout the procedure message numbers are referenced. These messages may be found in appendix A.

#### 0.1.2 - Tools Required

- 1 - Stop Watch type
- 2 - Opaque paper 1/2" x 3"
- 3 - 100" straight edge
- 4 - Tape Measure
- 5 - 36" ruler
- 6 - Adhesive tape for marking walking belt
- 7 - Half functioning brain

### 0.1 - Initial Treadmill Type Setting

0.1.1 - Turn off the power to the treadmill and while holding the START key, switch on the power to the treadmill. OBSERVE the Message Center shows:

' VERSION = x.x ' 1.01

where x.x is the version of the test procedure.

0.1.2 - Press the START key. OBSERVE the Message Center Shows

' TYPE = 10 ' ✓

If the Message Center Shows TYPE = 10 skip to section 0.1.6

0.1.3 - Press the RESET WORKOUT key and then the FUNCTION UP ARROW key until the Message Center shows:

' TYPE = 10 ' ✓

0.1.4 - Press the START key and then turn the power off. *LAST W/A 000011*

0.1.5 - Repeat section 0.1.1 and 0.1.2 and OBSERVE the Message Center shows:

' TYPE = 10 ' ✓

DO NOT PROCEED IF THIS STEP FAILS

0.1.6 - Switch the power to the treadmill off.

## 1.10 - Initial Display

1.10.1 - Switch the power on to the treadmill. OBSERVE the following displays:

Elevation	0.0	
Speed	1.5	
Message Center -	Message #1	- Trackmaster
	Message #2	- Begin Exercise
All other displays off		

1.10.2 - OBSERVE the elevation resets to 0% grade.

## 1.2 - ELEVATION

## 1.20 - Elevation Accuracy Check

1.20.1 - Press the ELEVATION UP ARROW key until the display shows 1% grade. Then press the ELEVATION DOWN ARROW key and OBSERVE the treadmill elevates to 0% grade.

1.20.2 - Attach a 100" straightedge along the side edge of the treadmill from the pivot point forward. Place a sheet of paper behind the stick and mark the 0% grade on the paper with a horizontal line.

1.20.3 - Press the up arrow key twice. OBSERVE the elevation display reads 1.0. Mark the paper at the 100" point. Repeat this step for each 1.0% grade.

1.20.4 - Measure the marks on the paper, perpendicular to the horizontal line and record the measurement on the data sheet. The measurement should match the elevation in inches, example 1.0 on display should measure 1" at first point. Calculate the percentage error and record on data sheet. See Appendix B for calculation.

## ALTERNATE MEASUREMENT

1.20.31 - Measure at the end of the stick directly to the ground and record on data sheet. The measurement should match the elevation display in inches (example 1.0 on display should measure 1.0" at end of stick).

1.20.32 - Continue incrementing the elevation by 1.0 percent until the display reads 22.0% and record the measurements.

1.20.33 - Calculate the error and record on data sheet. OBSERVE that it is within 1% of the true elevation. See Appendix B for calculation.

# 1 - MANUAL MODE TESTING

## 1.21 - Elevation Arrow Check

- ✓ 1.21.1 - Hold the ELEVATION DOWN ARROW key. OBSERVE the display begins to decrement slowly. After 4 counts, speeds to a medium speed then, after 4 counts runs very fast. The treadmill will begin to elevate down.
- ✓ 1.21.2 - Hold the ELEVATION UP ARROW key. OBSERVE the display begins to increment slowly. After 4 counts speeds to a medium speed then after 4 counts runs very fast. The treadmill will begin to elevate back up.

*Access Bars Too Difficult - To Use*

## 1.30 - Elevation Random Access *MUST TOUCH OVER 4 COUNTS TO GET IT TO WORK*

- ✓ 1.30.1 - Touch the ELEVATION RANDOM ACCESS bar at 0 and OBSERVE the elevation display shows 0.0 and the 0 led on the random access bar is lit.
- ✓ 1.30.2 - Touch the ELEVATION UP ARROW key one step at a time and OBSERVE the leds on the random access bar light when the corresponding number appears on the elevation display. Continue until the display shows 22%.
- ✓ 1.30.3 - Touch the ELEVATION RANDOM ACCESS bar by the led marked 18. OBSERVE the light above 18 goes out and the elevation display shows 18 and the treadmill elevates to 18% grade. Continue pressing on each random access elevation led and OBSERVE the elevation display shows the corresponding number until 0% grade is reached.
- ✓ 1.30.4 - Touch the ELEVATION RANDOM ACCESS bar numbered 0 and slide your finger up the scale. The numbers on the elevation display will move up and the led's on the elevation random access will light as your finger passes over the led.
- ✓ 1.30.5 - Touch the ELEVATION RANDOM ACCESS bar numbered 0 and OBSERVE the treadmill adjusts to 0% grade.

## 1.4 - Start - Stop - End Exercise

### 1.40 - Start Key

1.40.0 - Press the START key. OBSERVE the following:

1.40.1 - OBSERVE the Message Center displays Belt Starting and then starts to scroll off the display followed by four asterisks.

# 1 - MANUAL MODE TESTING

✓ 1.40.2 - OBSERVE after eight sets of 4 asterisks, help messages appear as listed in the chart below. In between each message is 8 sets of asterisks.

Message #	
# 3 ✓	Stop
# 4 ✓	End Exercise
# 5 ✓	Speed
# 6 ✓	Random Access Speed <i>2.0 MPH</i>
# 7 ✓	Elevation
# 8 ✓	Random Access Elevation
# 9 ✓	Timer Mode
#10 ✓	Function mode

✓ 1.40.3 - OBSERVE the time display begins to increment every second.

1.40.4 - OBSERVE the distance and calories display lights and the elevation and speed profile shows one led on the first bar.

1.41 - Stop Key

✓ 1.41.1 - Set the speed to 4 using the SPEED UP ARROW key. OBSERVE the treadmill adjusts to 4 mph.

✓ 1.41.2 - Press the STOP key. OBSERVE the following:

SPEED RESET TYPE SETTING -

✓ 1.41.2.1 - The treadmill belt stops then moves very slowly

1.41.2.2 - The speed display shows --.- until the belt stops then shows 1.5.

✓ 1.41.2.3 - The Message Center displays

Message # 12 - Trackmaster

Message # 13 - Press Reset

NON SPEED RESET TYPE SETTING

1.41.2.1 - The treadmill belt stops

1.41.2.2 - The speed display shows 4.0

1.41.2.3 - The Message Center displays message # 12 then message 13 .

1.42 - End Exercise Key

✓ 1.42.1 - Press the START key and adjust the speed to 3.0 and elevation 3.0. OBSERVE the treadmill elevates to 3% grade and the speed adjusts to 3 mph.

✓ 1.42.2 - Press the END EXERCISE key. OBSERVE the elevation adjusts to 0 and the speed to 1.5. When the speed reaches 1.5 the belt will stop.

✓ 1.42.3 - OBSERVE the Message Center displays the same as 1.42.2 and the Elevation display shows 0.0 and the Speed display shows 1.5 and the Time display shows the total time since last reset.

#### 1.43 - Magnet Safety Key

✓ 1.43.0 - Press the START key. OBSERVE the controller and treadmill reacts as in section 1.40.

✓ 1.43.1 - Remove the MAGNET SAFETY key. OBSERVE the belt stops as in section 1.41.2 .

✓ 1.43.2 - Press the START key. OBSERVE the Message Center shows message #25 (replace magnet message) and the sounder sounds.

#### 1.5 - Speed Check

##### 1.50 - Speed Accuracy Check

*Belt 124"*

✓ 1.50.1 - Place a piece of masking tape on the belt. Measure the circumference of the belt using a tape measure and record on the data sheet.

✓ 1.50.2 - Press the START key. OBSERVE the belt starts and the displays light.

✓ 1.50.2 - Set the speed to 1.5 and using a stop watch measure the time it takes the belt to move 25 revolutions. Record the time on the data sheet.

1.50.3 - Repeat the test for the following speeds:

*157.11 59.84*

1.5, 3, 5, 10 mph

*35.40 17.61*

✓ 1.50.4 - Calculate the speeds. OBSERVE the speed is within 1% of set value.

#### 1.51 - Speed Arrow Key

✓ 1.51.1 - Press and hold the SPEED DOWN ARROW key. OBSERVE the display begins to decrement slowly. After 4 counts speeds to a medium speed then after 4 counts runs very fast. The walking belt will begin to slow down.

✓ 1.51.2 - Press and hold the SPEED UP ARROW key. OBSERVE the display begins to increment slowly. After 4 counts speeds to a medium speed then after 4 counts runs very fast. The walking belt will begin to speed up.



1.6 - Speed Random Access

1.60.0 - If the belt is not running touch the START key. OBSERVE the belt starts.

1.60.1 - Touch the SPEED RANDOM ACCESS bar at 1.5 . OBSERVE the speed display shows 1.5 and the 1.5 led on the random access bar is lit.

1.60.2 - Touch the SPEED UP ARROW key one step at a time. OBSERVE the leds on the random access bar light when the corresponding number appears on the speed display. Continue until the display shows 10.0 .

1.60.3 - Touch the SPEED RANDOM ACCESS led number 8. OBSERVE the light above 8 goes out and the speed display shows 8.0; the treadmill adjusts to 8.0 mph grade. Continue pressing on each random access speed led and OBSERVE the speed display shows the corresponding number until 1.5 mph is reached.

1.60.4 - Touch the 1.5 on the SPEED RANDOM ACCESS control and slide your finger up the scale. The numbers on the speed display will move up and the leds on the speed random access will light as your finger passes over the leds.

1.7 - Reset WORKOUT key

1.70.1 - If the belt is not running press the Start key. OBSERVE the belt starts and the displays light as stated in 1.40.

1.70.2 - Press the RESET WORKOUT key. OBSERVE the time display resets to 0 and then starts advancing by one second. No other displays should be effected.

1.70.3 - Press the END EXERCISE KEY and OBSERVE the belt slows and stops and the elevation adjusts to 0% grade.

1.70.4 - Press the RESET WORKOUT key. OBSERVE all the displays go blank except for speed and elevation. The Message Center Shows  
message #1 Trackmaster  
message #2 Start

1.8 - Auto Reset

1.80.1 - Press the START key. OBSERVE the belt starts and the displays light as per section 1.40 Start Key section .

1.80.2 - Press the STOP key and simultaneously start the stop watch. When the Calories, Distance, Time and Profile displays blank stop the stop watch. OBSERVE the stop watch shows 2 minutes +- 3 seconds.

## 2.10 -Time Arrow Key

✓ 2.10.1 - Insure the belt is stopped and touch RESET WORKOUT key. OBSERVE the displays reset as outlined in 1.1 initial displays.

✓ 2.10.2 - Hold the TIME UP ARROW key. OBSERVE the Time display begins to increment slowly. After 4 counts speeds to a medium speed then after 4 counts runs very fast. When the display reaches 99.00 the display will go to 00.00 and continue to increment.

✓ 2.10.3 - Hold the TIME DOWN ARROW key. OBSERVE the display begins to decrement slowly. After 4 counts speeds to a medium speed then after 4 counts runs very fast. When the Time display shows 00.0 the display will stop decrementing.

## 2.2 - Time Random Access

✓ 2.20.1 - Touch the TIME RANDOM ACCESS control 3 and OBSERVE the Time display shows 3.

2.20.2 - Slide your finger up the TIME RANDOM ACCESS control. OBSERVE the Time display changes as follows:

3 6 10 15 20 25 30  
25 20

*WENT TO 30 FIRST*

## 2.3 - Running Timer Mode

✓ 2.30.1 - Touch 3 on the TIME RANDOM ACCESS control. OBSERVE the Time display shows 03.00.

✓ 2.30.2 - Touch the START key. OBSERVE the displays light and the belt starts and the time display starts to decrement.

✓ 2.30.3 - Adjust the speed to 3 mph and elevation to 3% grade and OBSERVE the treadmill adjusts accordingly.

✓ 2.30.4 - OBSERVE when the Time display changes from 00.03 to 00.02 the sounder sounds.

✓ 2.30.5 - When the Time display shows 00.00. OBSERVE the elevation resets to 0 and the speed adjusts to minimum speed then the belt stops.

*2 Times Sounder Ht From 00 & Below  
Total Time*

## 3.10 - Help Key

3.10.1 - Press the HELP key and OBSERVE the Message Center displays message #14.

3.10.2 - Press the keys as stated in the chart below and OBSERVE the messages are displayed for each key. Press the key a second time and the normal function of the key should return.

Key	Message	Notes
Elevation Up Arrow	#7 ✓	
Elevation Down Arrow	#7 ✓	
Random Access Elevation	#8 ✓	Each Switch
Function Up Arrow	#10 ✓	
Function Down Arrow	#10 ✓	
Reset WORKOUT	#13 ✓	
Time Up Arrow	#9 ✓	
Time Down Arrow	#9 ✓	
Random Access Time	#11 ✓	Each Switch
Speed Up Arrow	#5 ✓	
Speed Down Arrow	#5 ✓	
Random Access Speed	#6 ✓	Each Switch
Start	#15 ✓	
End Exercise	#16 ✓	
Stop	#17 ✓	

## 3.2 - Time Accuracy Check

3.20.1 - Touch 3 on the TIME RANDOM ACCESS bar. OBSERVE the Time display shows 3.00. 3,00.47

3.20.2 - Simultaneously touch the START key and start the stop watch. OBSERVE the displays light and the belt starts and the Time display start to decrement.

3.20.3 - Adjust the speed and elevation to 3 and OBSERVE the treadmill adjusts accordingly.

3.20.4 - OBSERVE when the Time display changes from 00.03 to 00.02 the sounder sounds.

3.20.5 - When the Time display shows 00.00 stop the stop watch and record the time on the data sheet. OBSERVE the elevation resets to 0 and the speed adjusts to minimum speed.

3.20.6 - Calculate the error. OBSERVE the error calculated is within  $\pm 0.5\%$  error.

## 3.3 - Distance Accuracy

3.30.1 - Touch the RESET WORKOUT key. OBSERVE the displays show the initial mode as in section 1.0 except the Random access control leds are still lit.

✓ 3.30.2 - Touch the START key. OBSERVE the belt starts and the displays light as in section 1.4.

✓ 3.30.3 - Adjust the speed to 6.0 mph. OBSERVE the belt speed adjusts to 6.0 mph. *29.01.51*

✓ 3.30.4 - Measure the speed of the belt as in section 1.50 and record the time and calculate the speed on the data sheet. *29.01*

✓ 3.30.5 - When the distance display changes, start the stop watch and record the distance on the data sheet. *04.12 1.12*

3.30.6 - As soon as the distance has incremented one mile from the above step, stop the stop watch. *2.59.00*

✓ 3.30.7 - Calculate the distance and record on the data sheet using the formula in Appendix C. *6.0781*

✓ 3.30.8 - Observe the distance is within  $\pm 0.5\%$ .

✓ 3.30.9 - Press the END EXERCISE KEY. OBSERVE the treadmill reacts as in 1.42.

## 3.4 - Calorie Accuracy

✓ 3.40.1 - Press the RANDOM ACCESS ELEVATION control marked 0 and press the RESET WORKOUT key. OBSERVE the displays are reset to the initial mode as in section 1.0. The random access elevation 0 and random access speed 1.5 leds may be lit.

✓ 3.40.2 - Press the START key. OBSERVE the belt starts and the displays light.

3.40.3 - Reference the chart in appendix D Calories accuracy check for elevation and speed. Adjust the elevation and speed to the first value. OBSERVE the treadmill adjusts to the speed and elevation set. *1.51* *1 min*

3.40.4 - When the Calories display changes press the reset WORKOUT key and record the calories display on the data sheet in CAL1 section.

3.40.5 - When the Time display changes to 03:00 record the calories display on the data sheet in column CAL2 column.

3.40.6 - Press the STOP key and then press the RESET WORKOUT key. OBSERVE the belt stops and then the displays reset.

*Handwritten calculations:*  

$$\frac{2.59 \times 60}{2.59} = 60$$

$$\frac{2.59 \times 60}{2.59} = 60$$

### 3 - DISPLAY TESTING

- ✓ 3.40.7 - Repeat sections 3.40.2 through 3.40.6 using Appendix D. OBSERVE that the calorie is within 1% of the display.
- ✓ 3.40.8 - Press the END EXERCISE key and observe the treadmill elevates to 0 and speed adjusts to 1.5 then the belt stops

#### 3.5 - Elevation and Speed profile display

- ✓ 3.50.1 - Press the RESET WORKOUT key. OBSERVE the displays are in section 1.0. The Random access leds may be lit.
- ✓ 3.50.2 - Press the START key. OBSERVE the belt starts and the displays light.
- ✓ 3.50.3 - Adjust the speed up and down using the SPEED ARROW keys or the SPEED RANDOM ACCESS control. OBSERVE the SPEED PROFILE follows the speed random access leds.
- ✓ 3.50.4 - Adjust the elevation up and down using the ELEVATION ARROW keys or the RANDOM ACCESS ELEVATION Control. OBSERVE the ELEVATION PROFILE follows the elevation random access leds.
- ✓ 3.50.5 - OBSERVE the Time display and when it shows 4.00, the next bar on the random access profiles should light.
- 3.50.6 - Repeat sections 3.50.3 through 3.50.5 for 4 minute increments until 32 minute is reached.
- 3.50.7 - Press the STOP key and OBSERVE the Belt Stops.

#### 4.1 - Weight Input

- ✓ 4.10.1 - Press both FUNCTION ARROW keys. OBSERVE the display shows:

' WEIGHT = 154 '

- ✓ 4.10.2 - Press the help key. OBSERVE the display shows:

Message #18 - Weight Message

- ✓ 4.10.3 - Press and hold the FUNCTION UP ARROW key. OBSERVE the Message Center display begins to increment slowly. After 4 counts speeds to a medium speed then after 4 counts runs very fast. When the Message Center display reaches 400 the display will stop incrementing.

- ✓ 4.10.4 - Hold the FUNCTION DOWN ARROW key. OBSERVE the Message Center display begins to decrement slowly. After 4 counts speeds to a medium speed then after 4 counts runs very fast. When the Message Center display shows 15 the display will stop decrementing.

- ✓ 4.10.5 - Adjust the weight to 154.

- ✓ 4.10.6 - Press the RESET WORKOUT key. OBSERVE the displays reset as in initial conditions 1.0

#### 4.2 - Review WORKOUT Mode

- ✓ 4.20.1 - Press both FUNCTION ARROW Keys twice and OBSERVE the Message Center display shows:

' WORKOUT = 1 '

- ✓ 4.20.2 - Press the Help key. OBSERVE the Message Center shows message #19.

4.20.3 - OBSERVE the displays show the WORKOUT as in APPENDIX E. The Elevation and Speed display shows the maximum for the WORKOUT. The Calories, Distance and Time display shows the Total for the WORKOUT. The Elevation and Speed Profile shows the level for each stage from 1 to 8.

- ✓ 4.20.4 - Press the FUNCTION UP ARROW key and repeat section 4.20.2. for workouts 1 - 20.

- ✓ 4.20.5 - Press the following keys and OBSERVE the Message Center shows Message #22A.

Elevation Arrow and all Elevation Random Access  
Speed Arrow and all Speed Random Access  
Time Arrow and Time Random Access

#### 4 - PROGRAM MODE

### 4.3 - Run Preprogram Workout Mode

- 4.30.1 - Touch the FUNCTION ARROW key and adjust the Message Center to WORKOUT # 1.
- 4.30.2 - Press and hold the START key. OBSERVE the sounder sounds and the Message Center Shows 'BELT STARTING'. After approximately three seconds, the belt will start the elevation and speed will adjust to the first stage as in appendix E. The Time display will start to decrement and the Calories and Distance display will start to increment.
- 4.30.3 - OBSERVE when the Time display reaches 00.03 the sounder will sound signaling a stage change. When the stage changes the Message Center will display:  
                        'Stage 2'
- 4.30.4 - Repeat sections 4.30.3 for all the stages in the workout.
- 4.30.5 - When the last stage is completed, OBSERVE the Elevation elevates to 0% grade and Speed slows to 1.5 and the belt stops.
- 4.30.6 - Repeat sections 4.30.3 through 4.30.5 for workout # 20.

#### 4.4 - Stage Review Mode

- 4.40.1 - Press both FUNCTION ARROW keys twice and adjust the Message Center display to show:
- 'WORKOUT = 1'
- 4.40.2 - Press both FUNCTION ARROW Keys once and OBSERVE the Message Center display to show:
- 'STAGE = 1'
- 4.40.3 - Press the HELP Key and OBSERVE the Message Center displays message #20 .
- 4.40.4 - OBSERVE the displays show the workout as in APPENDIX E. The Elevation and Speed and Time display shows the elevation and speed Time for the workout. The Calories, Distance display shows the Total for the workout. The Elevation and Speed Profile shows the level for each stage from 1 to 8.
- 4.40.5 - Press the FUNCTION UP ARROW key and repeat section 4.40.4. for stages 2-8.

#### 4 - PROGRAM MODE

✓ 4.40.6 - Press the following keys and OBSERVE the Message Center shows Message #22B each time the keys are pressed.

- ✓ Elevation Arrow and Random Access
- ✓ Speed Arrow and Random Access
- ✓ Time Arrow and Random Access

✓ 4.40.7 - Press the RESET WORKOUT key and OBSERVE the display show the initial condition as in section 1.0 .

#### 4.5 - Program Mode

✓ 4.50.1 - Press both FUNCTION ARROW Keys twice and adjust the Message Center display to show WORKOUT = 21 .

✓ 4.50.2 - Press both FUNCTION ARROW Keys once and OBSERVE the Message Center display to show STAGE = 1 .

✓ 4.50.3 - Press the HELP Key and OBSERVE the Message Center displays message #20 .

4.50.4 - Using the Elevation, Speed and Time Arrow and Random Access Control, set them according to APPENDIX F Stage 1.

4.50.5 - Press the FUNCTION UP ARROW key. OBSERVE the Distance and Calorie display show the same as in APPENDIX F. OBSERVE the Elevation and speed profile leds are lit as programmed.

4.50.6 - Repeat section 4.50.4. for stages 2-8.

4.50.7 - Press the FUNCTION DOWN ARROW key and adjust the Message Center to read STAGE 1.

4.50.8 - Press and hold the START key. OBSERVE the sounder sounds, the Message Center Shows 'BELT STARTING'. After approximately three seconds the belt will start, the elevation and speed will adjust to the first stage of the workout as in Appendix F. The Time display will start to decrement and the Calories and Distance display will start to increment.

4.50.9 - OBSERVE when the Time display reaches 00.03 the sounder will sound signaling a stage change. When the stage changes the Message Center will display STAGE 2.

4.50.10 - Repeat sections 4.50.9 for all the stages in the workout.

4.50.11 - When the last stage is completed OBSERVE the Elevation elevates to 0% grade and Speed slows to 1.5 and the belt stops.

4.50.12 - OBSERVE the Calories, Distance and Time display show the total for the workout in APPENDIX F.



4.50.13 - Turn the power off the the treadmill. Then turn the power back on and OBSERVE the displays are as in the initial condition as in section 1.0

4.50.14 - Repeat sections 4.50.1 and insure the workout is still intact. Check Workout 40 is still intact.

## 5.1 - TM Error detection

### 5.10 - Elevation Resetting

5.10.1 - Adjust the elevation to 22% grade using the RANDOM ACCESS ELEVATION control. OBSERVE the treadmill elevates to 22% grade.

5.10.2 - Switch the power off to the treadmill and then switch the power back on. OBSERVE the treadmill begins to elevate down and the displays are as in 1.1 initial display.

5.10.3 - Before the elevation reaches 0, touch the ELEVATION ARROW keys and OBSERVE the Message Center shows message #23.

5.10.3 - Before the elevation reaches 0 touch the Elevation Random Access bar and OBSERVE the Message Center shows message #23.

### 5.12 - Elevation Signal Error

5.12.1 - Adjust the elevation to 22% and while the elevation is moving place a piece of opaque paper into the path of the elevation sensor. OBSERVE after 3 seconds the elevation reverses and resets to 0% grade. OBSERVE the elevation display resets to 0% , and the Message Center shows message #41 elevation sensor error message.

5.12.2 - Touch the ELEVATION ARROW keys and RANDOM ACCESS ELEVATION control and OBSERVE the Message Center shows message # 23 elevation reset message then message #41 elevation sens error.

5.12.3 - With the paper blocking the sensor, elevate the treadmill to 5% and OBSERVE the treadmill elevates for approximately 3 seconds then reverses and resets to 0% elevation and the Message Center shows message #41 elevation sensor error message.

5.12.4 -Remove the paper and adjust the elevation to 22% and OBSERVE the treadmill elevates to 22%.

5.12.5 - Adjust the elevation to 1% and while the elevation is moving place a piece of opaque paper into the path of the elevation sensor. OBSERVE after 3 seconds the elevation display resets to 0%, the treadmill continues to elevate to 0% grade and the Message Center shows message #41 elevation sensor error message.

5.12.6 - As the elevation is resetting, touch the ELEVATION ARROW and the RANDOM ACCESS ELEVATION control. OBSERVE the Message Center shows message #23 then message 41.

### 5.13 - Speed Sensor Error

5.13.1 - Press the START key and OBSERVE the belt starts.

5.13.2 - Adjust the speed to 3.0 mph and place a piece of opaque paper into the path of the speed sensor.

OBSERVE 1 - The Message Center display shows:

'SPD SENS ERR 20'

2 - The speed display shows --.- .

3 - The speed begins to slow until it engages the slow limit switch.

5.13.3 - Press the STOP key and OBSERVE the Message Center shows message #12 then #13.

5.13.4 - With the opaque paper in the path of the speed sensor press the START key. OBSERVE after 2 seconds the displays are showing as in 5.13.2 .

5.13.5 - Remove the opaque paper and OBSERVE there is no change.

5.14.6 - Press the STOP key. OBSERVE the belt stop.

### 5.14 - Automatic Speed Reset type Check

5.14.1 - Switch the power off on the treadmill. Place a piece of opaque paper in the path of the speed sensor and switch the treadmill power on. OBSERVE after 2 seconds the Message Center shows message #38 non ASR message.

5.14.2 - Switch the power off on the treadmill then switch it back on. OBSERVE the treadmill displays as in section 1.0 initial display.

### 5.15 - Speed Resetting Error

✓ 5.15.1 - Press the START key. OBSERVE the treadmill starts as in section 1.40 .

✓ 5.15.2 - Adjust the speed to 3 mph using the SPEED UP ARROW key and wait until the belt reaches the speed.

✓ 5.15.3 - Press the STOP key. OBSERVE the treadmill belt stops.

✓ 5.15.4 - Quickly press the START key. OBSERVE the Message Center displays message #26 speed sensor error.

## 5.2 - TM Type Change

5.20.1 - Turn off the power to the treadmill. While holding the START key switch on the power to the treadmill. OBSERVE the Message Center shows:

' VERSION = x.x '

where x.x is the version of the test procedure

5.20.2 - Press the START key. OBSERVE the Message Center shows:

' TYPE = 10 '

5.20.2 - Press the FUNCTION UP ARROW key and OBSERVE the Message Center shows:

' TYPE = 11 '

5.20.3 - Press the START key and then turn the power off.

5.20.4 - Repeat section 5.20.1 and 5.20.3 and OBSERVE the Message Center shows:

' TYPE = 11 '

## 5.3 - Odometer and Time Log

5.30.1 - Turn off the power to the treadmill. While holding the START key switch on the power to the treadmill. OBSERVE the Message Center shows:

' Version = x.x '

where x.x is the version of the test procedure

5.30.2 - Press the START key. OBSERVE the Message Center shows:

' TYPE = 11 '

or

' TYPE = 10 '

Adjust if necessary to type 11.

5.30.3 - Press the START key. OBSERVE the Message Center shows the message:

' LAST WAX xxxxxx '

x = don't care

5.30.4 - Press the RESET WORKOUT key and OBSERVE the Message Center shows the message:

' LAST WAX 000000 '

5.30.5 - Press the RESET WORKOUT key and OBSERVE the Message Center shows the message:

' LAST WAX 000000 '

✓ 5.30.6 - Press the START key. OBSERVE the Message Center shows the message:

' L W TIME 000000 '

✓ 5.30.7 - Press the START key. OBSERVE the Message Center shows the message:

18

' ODOMETER xxxxxx '  
x = don't care

Record the odometer reading on the data sheet. 18

5.30.8 - Press the START key. OBSERVE the Message Center shows the message:

' TOT TIME xxxxxx '  
x = don't care

Record the Tot Time on the data sheet. 177206

5.30.9 - Switch the power off on the Treadmill. Then switch the power on. OBSERVE the treadmill displays the initial condition as in section 1. NON PEA START - Run Time 01

5.30.10 - Press the RANDOM ACCESS TIME control number 10. OBSERVE the time display shows 10.00. 6 - 15 and

✓ 5.30.11 - Press the TIME UP ARROW so the Time display shows 11.00.

✓ 5.30.12 - Press the START key and adjust the speed for 6 mph. OBSERVE the speed adjusted to 6 mph.

✓ 5.30.13 - When the Time display reaches 00.00 the belt will slow, then stop. OBSERVE the Distance and Time display and record them on the data sheet. 1.10 1.20

✓ 5.30.14 - Press the RESET WORKOUT key and the display will show the initial conditions.

5.30.15 - Turn off the power to the treadmill. While holding the START key switch on the power to the treadmill. OBSERVE the Message Center shows Version = x.x where x.x is the version of the test procedure.

5.30.16 - Continue pressing the START key and OBSERVE the following:

✓ ' Type - 11 '

Press START

✓ ' LAST WAX 000001 '

Press START

✓ ' L W TIME 000011 '

Press START

' ODOMETER xxxxxx ' 000000  
 where x = last odometer reading +1

Press START

' TOT TIME xxxxxx ' 877247 116  
 where x = last tot time + 11

#### 5.4 - Last Wax Check

✓ 5.40.1 - Turn off the power to the treadmill and while holding the START key switch on the power to the treadmill. OBSERVE the Message Center shows:

' Version = x.x '  
 where x.x is the version of the test procedure.

✓ 5.40.2 - Press the START key twice and OBSERVE the Message Center shows:

' LAST WAX xxxxxx ' 01

5.40.3 - Press both TIME ARROW keys and OBSERVE the Message Center shows:

' LAST WAX 008000 '

✓ 5.40.4 - Press the START key twice and OBSERVE the Message Center shows:

' ODOMETER xxxxxx ' 000000  
 x = don't care

✓ 5.40.5 - Switch the power off then on. OBSERVE the displays are showing the initial conditions as in section 1.0. OBSERVE the Message Center is showing:

message #1 then message #2

✓ 5.40.6 - Press the START key. When the Distance display shows .01, press the STOP key.

✓ 5.40.7 - Press the RESET WORKOUT key and OBSERVE the displays are showing the initial conditions as in section 1.0. OBSERVE the Message Center is showing:

message #1 then message #2 then message # 24 40

#### 5.5 - Display Test

✓ 5.50.1 - Repeat section 5.30.1 through 5.30.8 without recording the data on the data sheet.

5.50.2 - Press the start key and OBSERVE the following:

1 - Each numeric digit is cycling through:

0,1,2,3,4,5,6,7,8,9,-,e,h,l,p,' '

2 - All discrete LEDs are cycling on and off.

3 - The Elevation and Speed profile is showing a striped pattern.

4 - The Message Center is showing all characters.

## 5 - TM Diagnostics Mode

### 6.0 - Treadmill Type Check

#### 6.1 - Treadmill Type Check

6.10.1 - Repeat section 5.20.1 through 5.20.3 substituting the treadmill type with the type in appendix H. *h.6*

6.10.2 - Check that the minimum speed and maximum speed are as in Appendix H for the type selected.

6.10.3 - Repeat 6.10.1 , 6.10.2 for all treadmill types.

#### 6.2 - Treadmill Transmission Accuracy Check

##### 6.20 - Standard Type Treadmill

6.20.1 - Repeat section 6.1 setting the treadmill for type #13 kilometer version.

6.20.2 - Perform the speed accuracy check section 1.50 using Appendix B.

6.20.3 - Perform the distance accuracy check section 3.30 using Appendix C.

##### 6.21 - Slow Type Check

6.21.0 - Place the box on a slow type Treadmill and repeat section 6.1 setting the treadmill for type #16.

6.21.1 - Perform the speed accuracy check section 1.5 for type# 6 Slow Version.

6.21.2 - Perform the distance accuracy check section 3.30 using Appendix C.

##### 6.22 - Shimpo Type Check

6.21.0 - Place the box on a slow type Treadmill and repeat section 6.1 setting the treadmill for type #16.

6.21.1 - Perform the speed accuracy check section 1.5 for type# 6 Shimpo Version.

6.21.2 - Perform the distance accuracy check section 3.30 using Appendix C.



# APPENDIX A

## MESSAGES

Message #	MESSAGE	HOLD TIME
#1	' TRACKMASTER '	2 SEC
	'INTRODUCES THE ** TM500 **'	2 SEC
#2	'... .. TO BEGIN EXERCISE ..'	2 SEC
	'..STRADDLE BELT.'	2 SEC
	'..PRESS START '	2 SEC
	...	
#3	'TO END WORKOUT...'	1 sec
	'PRESS END EXERCISE....'	1 sec
	'TO QUICKLY STOP BELT... '	1 sec
	'PRESS STOP KEY...'	1 sec
	' OR PULL MAGNET KEY '	1 sec
#4	'END EXERCISE KEY'	1 sec
	' MOVES ELEVATION TO 0 '	1 sec
	'SLOWS BELT TO MIN SPEED.. '	1 sec
	'THEN STOPS BELT '	1 sec
#5	' TO ADJUST SPEED...'	2 sec
	' USE SPEED ARROW KEYS... '	2 sec
	'UP ARROW FASTER... '	1 sec
	' DOWN ARROW SLOWER... '	1 sec
#6	' TO USE RANDOM ACCESS SPEED CONTROL...'	2 sec
	'PRESS LIGHT ON ARC...'	.5 sec
	' SLIDE UP OR DOWN '	.5 sec
	'TO DESIRED LEVEL... '	.5 sec
#7	' TO ADJUST ELEVATION... '	2 sec
	' USE ARROW KEYS... '	1 sec
	'UP ARROW HIGHER '	1 sec
	'... DOWN ARROW LOWER...'	1 sec
#8	' TO USE RANDOM ACCESS ELEV. CONTROL...'	2 sec
	'PRESS LIGHT ON ARC...'	.5 sec
	' SLIDE UP OR DOWN '	.5 sec
	'TO DESIRED LEVEL... '	.5 sec
#9	'USE TIMER MODE '	1 sec
	'TO EXERCISE FOR A PRESET TIME	1 sec
	'ADJUST TIME WITH TIME ARROW KEYS '	1 sec
	'OR USE RANDOM ACCESS TIME CONTROL ...'	1 sec

# MESSAGES

#10	'TO CHANGE WEIGHT '	1 sec
	'OR USE WORKOUTS '	1 sec
	'PRESS BOTH FUNCTION KEYS '	1 sec
	'WHILE BELT IS STOPPED ...'	1 sec
#11	' TO USE RANDOM ACCESS TIMER CONTROL...'	2 sec
	'PRESS DESIRED WORKOUT TIME ON BLUE BAR ...'	2 sec
#12	' THANK YOU FOR USING THE TRACKMASTER	
	** TM-500 ** TREADMILL ... '	1 sec
	'HAVE A GREAT DAY .. COME BACK SOON... '	
#13	' PRESS RESET '	1 sec
	'TO BEGIN NEW WORKOUT '	1 sec
	'... '	
#14	'PRESS THE KEY YOU NEED HELP WITH '	
	' ... PRESS ANY KEY '	2 sec
#15	'START KEY ... '	1 sec
	'BEGIN EXERCISE..'	1 sec
	' . STRADDLE BELT.'	1 sec
	'..PRESS START.'	2 sec
	'... '	
#16	'END EXERCISE KEY'	1 sec
	' MOVES ELEVATION TO 0 '	1 sec
	'SLOWS BELT TO MIN SPEED.. '	1 sec
	'THEN STOPS BELT '	1 sec
#17	'STOP KEY ... '	1 sec
	'PRESS STOP TO QUICKLY STOP BELT '	2 sec
#18	'TO CHANGE WEIGHT '	1 sec
	'PRESS THE FUNCTION ARROW KEYS'	
	'... PRESS FUN KEYS '	20 sec
#19	'REVIEW WORKOUTS '	1 sec
	'BY PRESSING UP OR DOWN FUNCTION KEYS '	1 sec
	'... PRESS START '	
	'TO BEGIN WORKOUT '	1 sec
	'... PRESS FUN KEY '	20 sec
#20	'TO REVIEW STAGE '	1 sec
	'PRESS FUNCTION KEY UP OR DOWN'	1 sec
#21	'TO PROGRAM WORKOUT '	1 sec
	'.... SELECT '	.5 sec
	'ELEVATION... TIME... SPEED... '	.5 sec
	'PRESS FUNCTION UP KEY FOR NEXT STAGE '	.5 sec
	'... PRESS FUN KEYS '	20 sec

# APPENDIX A

## MESSAGES

#22	'TO PROGRAM WORKOUT '	1 sec
	'SELECT WORKOUT 21-40'	1 sec
#22A	' PROGRAM ERROR '	1 sec
	'NOT IN STAGE MODE '	.5 sec
	'SELECT WORKOUT 21-40 '	.5 sec
	'SELECT STAGE MODE '	.5 sec
	'... PRESS FUN KEY '	20 sec
22B	' PROGRAM ERROR '	1 sec
	'SELECT WORKOUT 21-40 '	1 sec
	'... PRESS FUN KEY '	20 sec
#23	'RESETTING ELEVATION TO 0 '	1 sec
#24	'CALL SERVICE...'	1 sec
	'TO WAX BELT...'	1 sec
#25	' REPLACE MAGNET '	
#26	'SPEED RESETTING '	
#27	' WEIGHT = '	
#28	' WORKOUT = '	
#29	' STAGE '	
#30	' VERSION = '	
#31	' TYPE = '	
#32	'LAST WAX '	
#34	'L W TIME '	
#35	'ODOMETER '	
#37	'TOT TIME '	
#38	' NON ASR ERR '	;ERROR 11
#39	' RAM ERR '	;ERROR 12
#40	'SPD SENS ERR '	;ERROR 20
#41	'ELEV SENS ERR '	;ERROR 21
#42	'EE PROM ERR '	;ERROR 22
#43	'ERROR NO '	

## APPENDIX B

### ELEVATION ACCURACY

$$\text{elevation error} = \frac{\text{set elevation} - \text{measurement}}{\text{set elevation}}$$

### SPEED CALCULATION

$$\text{speed mi/hr} = \frac{(\text{Belt Length ft/rev} * \text{REV}(25))/5280 \text{ FT/MI}}{\text{TIME sec} * 1/60 \text{ min/sec} * 1/60 \text{ hr/min}}$$

$$\text{speed error} = \frac{\text{set speed} - \text{measurement}}{\text{set speed}}$$

### EXAMPLE

belt measurement 123 3/8" = 10' 3-3/8" = 10.28125 ft

$$\text{speed mi/hr} = \frac{(10.28125 \text{ ft/rev} * \text{REVOLUTIONS}(25)\text{rev})/5280 \text{ FT/MI}}{\text{TIME sec} * 1/60 \text{ min/sec} * 1/60 \text{ hr/min}}$$

$$\text{speed mi/hr} = \frac{.048153409 \text{ mi}}{\text{TIME sec} * .0002777778 \text{ hr/sec}} = 1/(\text{TIME} * .00570618)$$

Belt length feet /3.28 ft/m = Belt length meters

$$\text{speed km/hr} = \frac{(\text{Belt Length m/rev} * \text{REV}(25))/1000 \text{ m/km}}{\text{TIME sec} * 1/60 \text{ min/sec} * 1/60 \text{ hr/min}}$$

## APPENDIX C

### DISTANCE CALCULATION

6.0708

Distance = Speed mi/hr (measured) \* Time hr

Time measured sec \* 60 sec/min \* 60 min/hr = Time hr

$$\text{Error} = \frac{1 \text{ mile} - \text{Distance measured}}{1 \text{ mile}} < = .5 \%$$

Distance = Speed k/hr (measured) \* Time hr

Time measured sec \* 60 sec/min \* 60 min/hr = Time hr

$$\text{Error} = \frac{1 \text{ km} - \text{Distance measured}}{1 \text{ km}} < = .5 \%$$

## APPENDIX D

### CALORIES TESTING

1.0708

Trial	Elevation	Speed	Calorie
1	0	1.5	7.90
2	4	4	23.0
3	8	5	47.0
4	15	8	85.1
5	22	10	116

APPENDIX E  
Preprogrammed Workout

1 - 1 Mile Moderate Walk

STAGE	Elev	Speed	Time	wt-lbs	wt-kg	CAL	CAL	O2	Work Load
				154	70				
				CAL TOT	DIST	(C/m)	(C/SEC)	(ml/KG/mn)	(METS)
1	0	3.0	2	8.08	0.10	4.04	0.067	11.54	3.30
2	0	3.5	3	13.52	0.18	4.51	0.075	12.88	3.68
3	0	4.0	15	74.66	1.00	4.98	0.083	14.22	4.06
4	0	3.5	2	9.02	0.12	4.51	0.075	12.88	3.68
5	0	3.0	3	12.12	0.15	4.04	0.067	11.54	3.30
6	0	0.0	0	0.00	0.00	1.23	0.020	3.50	1.00
7	0	0.0	0	0.00	0.00	1.23	0.020	3.50	1.00
8	0	0.0	0	0.00	0.00	1.23	0.020	3.50	1.00
Total			25	117.39	1.54				
Max	0	4							

2 - 1 Mile Moderate Uphill

STAGE	Elev	Speed	Time	CAL TOT	DIST	CAL	CAL	O2	Work Load
						(C/m)	(C/SEC)	(ml/KG/mn)	(METS)
1	0	3.0	2	8.08	0.10	4.04	0.067	11.54	3.30
2	2	3.5	3	17.07	0.18	5.69	0.095	16.26	4.64
3	4	4.0	5	38.39	0.33	7.68	0.128	21.94	6.27
4	6	4.0	5	45.15	0.33	9.03	0.150	25.80	7.37
5	8	4.0	5	51.90	0.33	10.38	0.173	29.66	8.47
6	2	3.5	2	11.38	0.12	5.69	0.095	16.26	4.64
7	0	3.0	3	12.12	0.15	4.04	0.067	11.54	3.30
8	0	0.0	0	0.00	0.00	1.23	0.020	3.50	1.00
Total			25	184.08	1.54				
Max	8	4							

3 - 1 Mile Fast Walk/Jog

STAGE	Elev	Speed	Time	CAL TOT	DIST	CAL	CAL	O2	Work Load
						(C/m)	(C/SEC)	(ml/KG/mn)	(METS)
1	0	3.0	2	8.08	0.10	4.04	0.067	11.54	3.30
2	0	4.0	3	14.93	0.20	4.98	0.083	14.22	4.06
3	0	5.0	12	127.26	1.00	10.61	0.177	30.30	8.66
4	0	4.0	2	9.95	0.13	4.98	0.083	14.22	4.06
5	0	3.0	3	12.12	0.15	4.04	0.067	11.54	3.30
6	0	0.0	0	0.00	0.00	1.23	0.020	3.50	1.00
7	0	0.0	0	0.00	0.00	1.23	0.020	3.50	1.00
8	0	0.0	0	0.00	0.00	1.23	0.020	3.50	1.00
Total			22	172.34	1.58				
Max	0	5							

# APPENDIX G

## TREADMILL CONTROLLER

### Treadmill Type Settings

TM 500

<u>Speed Range</u>	<u>Notes</u>	<u>Maximum Elevation</u>	<u>Treadmill Length</u>
* 0 = 1.5 - 10.5	-	20%	Standard Base
* 1 = 1.5 - 10.5	-	22%	Standard Base
2 = 1.5 - 10.5	-	22%	Extended Base
* 3 = 1.5 - 10.5	-	20%	Extended Base
* 4 = 1.5 - 12.0	-	25%	Extended Base
* 5 = 0.5 - 10.0	Shimpo	22%	Extended Base
6 = 0.7 - 5.7	-	22%	Extended Base
7 = 1.5 - 12.0	-	22%	Extended Base
**8 = 1.5 - 10.5	Bosch Speed Reset	22%	Extended Base
9 = 2.4 - 16.8	Kilometer	22%	Extended Base
10 = 1.5 - 10.5	Speed Reset	22%	Extended Base
11 = 1.5 - 12.0	Speed Reset	22%	Extended Base
12 = 0.7 - 5.7	Speed Reset	22%	Extended Base
13 = 2.4 - 16.8	Speed Reset Kilo	22%	Extended Base
*14 = 1.5 - 10.5	Speed Reset	25%	Extended Base
*15 = 1.5 - 12.0	Speed Reset	25%	Extended Base

\* Not included in TM2 And TM3 software.

\*\*V1.8 Non ASR Bosch